

REMARKS

Claims 1, 2, 8, 9, 15 and 16 have been canceled, claims 22-27 have been added, and claims 3, 5-7, 10, 12-14, 17, and 19-21 have been amended. Therefore, claims 3-7, 10-14 and 17-27 remain pending in the application. Reconsideration is respectfully requested in light of the following remarks.

Claim objections:

The Examiner objected to claims 1, 2, 8, 9, 15, and 16 owing to various informalities. Applicants submit that these objections are moot in light of the cancellation of these claims.

Section 103(a) Rejections:

The Office Action rejected claims 1-3, 5-7, 8-10, 12-14, 15-17 and 19-21 under 35 U.S.C. § 103(a) as being unpatentable over Sato et al. (IEEE paper entitled "Evaluation of Architectural-Level Power Estimation for CMOS RISC Processors") (hereinafter, "Sato") in view of Kamble et al. (IEEE paper entitled "Analytical Energy Dissipation Models for Low Power Caches) (hereinafter, "Kamble"). The Office Action rejected claims 4, 11 and 18 under 35 U.S.C. § 103(a) as being unpatentable over Sato and Kamble in view of Duarte et al. (IEEE paper entitled "Impact of Technology Scaling in the Clock System Power") (hereinafter, "Duarte"). Although Applicants traverse this rejection, Applicants submit that it is moot in view of the amendments noted above, and Applicants submit that newly added independent claims 22, 24 and 26 distinguish over the cited art.

Applicants note that the cited art fails to teach or suggest all of the limitations of added claim 22. In particular, the cited art fails to teach or suggest a method in which an architecture simulation model generating a given one of a plurality of energy events in

response to processing an application trace, wherein each of said plurality of energy events corresponds to an aspect of operation of said integrated circuit that consumes energy; mapping said given energy event to one or more corresponding power models, wherein each of the power models hierarchically instantiates one or more of a plurality of base-level energy models; hierarchically evaluating each of the corresponding power models to identify each instantiated one of said plurality of base-level energy models; evaluating each given instantiated base-level energy model to estimate energy associated with activation of the given instantiated base-level energy model for said given energy event; and accumulating said energy in a power estimate corresponding to said given energy event.

Neither Sato nor Kamble disclose generation of a specific energy event through processing of an application trace by an architectural simulation model, and accumulation of a power estimate corresponding to the specific energy event generated via the hierarchical evaluation of power models, as recited in added claim 22. The Examiner acknowledges that Sato does not disclose a hierarchical relationship between power and energy models as recited in original claim 1 and, by extension, in added claim 22. Applicants concur that Sato does not disclose this relationship, and further submit that Sato does not teach or suggest the generation and mapping of energy events to power models as recited in added claim 22.

Applicants further submit that Kamble fails to teach or suggest these limitations. Kamble is particularly directed to the generation of analytical energy dissipation models that are not hierarchically evaluated in response to a particular energy event being generated during architectural modeling of an application trace. Rather, Kamble discloses the use of aggregate, probabilistic techniques for determining, on average, the energy consumption of a cache. That is, rather than model the activation of specific model components in response to a particular event generated through architectural simulation, Kamble estimates the aggregate probabilities that such components will be activated in order to determine an average number of activations or transitions, as noted in sections 4.1 and 4.2.

Owing to the use of analytic rather than empirical techniques, Kamble's approach to power estimation is fundamentally divergent from that recited in Applicants' claim 22. Through use of the probabilistic approach just mentioned, Kamble seeks to abstract away from considering event-driven device behavior in order to develop relatively simple models that describe average device behavior over time. However, Kamble specifically acknowledges that while such abstraction results in quicker power estimation, it does so at the expense of accuracy: "...though the analytical method might be the quickest way to estimate power, it generally overestimates when applied to the energy efficient architectures, sometimes by as much as 30%." (Kamble, p. 143)

By contrast, Applicants' added claim 22 specifically recites that an energy event generated during architectural modeling is mapped to one or more particular power models that hierarchically instantiate energy models, which are then evaluated to determine a power estimate that specifically corresponds to the generated energy event. Neither Sato nor Kamble support a method of power estimation that combines event-driven granularity and hierarchical model structure, as recited in added claim 22.

A similar argument applies to added claims 24 and 26, each of which recites limitations similar to claim 22. Therefore, for at least the reasons given above, Applicants submit that added independent claims 22, 24 and 26 distinguish over the cited references, as do those claims depending from these independent claims.

CONCLUSION


Applicants submit the application is in condition for allowance, and notice to that effect is respectfully requested.

If any extension of time (under 37 C.F.R. § 1.136) is necessary to prevent the above referenced application from becoming abandoned, Applicants hereby petition for such extension. If any fees are due, the Commissioner is authorized to charge said fees to Meyertons, Hood, Kivlin, Kowert, & Goetzel, P.C. Deposit Account No. 501505/5500-97900/BNK.

Also enclosed herewith are the following items:

- ☒ Return Receipt Postcard
- ☐ Petition for Extension of Time
- ☐ Request for Approval of Drawing Changes
- ☐ Notice of Change of Address
- ☐ Marked-up Copy of Amended Claims
- ☐ Marked-up Copy of Amended Paragraphs
- ☐ Fee Authorization Form authorizing a deposit account debit in the amount of \$
for fees ().
- ☐ Other:

Respectfully submitted,



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